

REMARKS/ARGUMENTS

Favorable reconsideration of this application is respectfully requested.

Examiner Diaz asked for English versions or abstracts of the foreign references submitted in the previous Information Disclosure Statement. Two of the references, 05-152574 and 06-069509, have corresponding US patents. These two patents as well as the English abstracts are submitted for consideration.

Claims 1, 2, 4-5, 16-18, 27-30 and 35-38 are pending in this application.

In the outstanding Office Action, claims 1-2, 4-5, 16-18, 27-30 and 35-38 were rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. (U.S. Patent No. 4,893,165) in view of Sakurai (U.S. Patent No. 5,200,632).

First, the Applicant greatly appreciates the interview with Examiner Diaz on July 27, 2005. During the interview Applicant's representative explained how the combination of cited references, namely Miller et al. and Sakurai does not suggest the claimed invention. In particular, Miller et al. discloses a structure in Fig. 1 having an inner zone 2, layer 15 and drain electrode 14. The Office Action characterizes layer 15 as the second conductivity type impurity layer recited in claim 1. As described in column 3, layer 15 is formed by ion implantation followed by a rapid thermal annealing to produce a thin layer. A drive-in is specifically avoided (see lines 34-42). The structure of Fig. 1 with layer 15 provided at the drain side of zone 2 provides desired effects (lines 45-50). Clearly there is only layer 15 adjacent to electrode 14 in Miller et al. and no thus disclosure or suggestion of the claimed structure having an impurity layer and a contact layer

The Office Action turns to Sakurai and states that it is well known in the art to include a layer 1 (asserted to be the recited contact layer) in a layer 12 (asserted to be the recited impurity layer), and that one skilled in the art would substitute layer 15 of Miller et al. for layer 12 of Sakurai. To begin, the concentration of layer 12 is p- while the concentration of

layer 15 is p+. Thus, the doping concentrations of layers 12 and 15 are significantly different and thus there is clearly no suggestion to combine the two structures in the manner set forth in the Office Action.

During the interview Examiner Diaz inquired about the impurity concentration of layer 15 in Miller et al. As described in the paragraph linking columns 2 and 3, layer 15 is produced by implantation at a dose between  $1 \times 10^{12}$  and  $1 \times 10^{15} \text{ cm}^{-2}$ . While a dose only cannot be correlated to a concentration range value, it is clear from the Fig. 2 in Miller et al. that the p+ region 15 is several orders of magnitude higher in concentration than n- zone 2, as evident from the logarithmic scale of Fig. 2.

The thicknesses of the layer in Sakurai are clearly much larger than that recited in claim 1. The Office Action asserts that it would be obvious to reduce the thickness of the collector regions 1 in Sakurai to the dimensions recited in the claim. However, the teachings of Sakurai do not support such an assertion. Collector regions 1 are formed by a “diffusion process” which is specifically avoided in Miller et al. One skilled in the art would recognize not to use a diffusion process to produce a layer thin enough to be “less than the depth of the layer 15 taught by Miller et al.” Further, region 1 is a “deep diffusion region” (column 9, lines 1-2) which teaches away from reducing region 1 to a “thin” region.

As shown in Figs. 5(a) and 5(b), the thickness of the p+ region 1 is approximately 50  $\mu\text{m}$ . Reducing this region to a thickness of no more than 0.2  $\mu\text{m}$ , as asserted in the Office Action, would require over a two order of magnitude reduction in thickness. Nothing in Sakurai or Miller et al. would suggest such a reduction. There is clearly no suggestion to one skilled in the art to reduce the thicknesses of the regions in Sakurai to the thicknesses recited in the claims.

What is also not clear from the Office Action is whether, even if it is accepted that the regions 1 and 12 in Sakurai could be reduced to the thicknesses recited in the claims, the

resulting structure would still function as desired. It is incumbent upon the USPTO to demonstrate that one skilled in the art would be motivated to reduce the thicknesses as asserted in the Office Action. One way of looking at this is to determine whether the resulting structure would provide the functionality and benefits described in Sakurai. There is no such evidence in the Office Action, making it even more clear that one skilled in the art would not combine the references or reduce the thicknesses of the layers in Sakurai as asserted in the Office Action.

It is respectfully submitted that the present application is in condition for allowance and a favorable decision to that effect is respectfully requested.

Respectfully submitted,

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